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manual

instruction

INSTRUCTION MANUAL

Model 5910 Series
IN-LINE READOUT

Beckman®

Berkeley Division

INSTRUCTION MANUAL

Model 5910 Series
IN-LINE READOUT

Lot No. ____

Serial No. _____

BERKELEY division
Beckman Instruments, Inc.

Richmond, California
29 December 1956

WARRANTY

Instruments sold by Berkeley Division, Beckman Instruments, Inc., (hereafter called "the Company") are warranted only as stated below.

Subject to the exceptions and upon the conditions specified below, the Company agrees to correct, either by repair, or, at its election, by replacement, any defect of material or workmanship which develops within one year after delivery of the instrument to the original purchaser by the Company or by an authorized representative, provided that investigation and factory inspection by the Company discloses that such defect developed under normal and proper use.

The exceptions and conditions mentioned above are the following:

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(b) The Company makes no warranty concerning components or accessories not manufactured by it, such as tubes, fuses, batteries, etc. However, in the event of the failure of any component or accessory not manufactured by the Company, the Company will give reasonable assistance to the purchaser in obtaining from the respective manufacturer whatever adjustment is reasonable in the light of the manufacturer's own warranty.

(c) The Company shall be released from all obligations under its warranty in the event repairs or modifications are made by persons other than its own service personnel or authorized representatives' personnel unless such repairs by others are made with the written consent of the Company.

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(g) This warranty shall be governed by the laws of the State of California.

Claims for damage in shipment should be filed promptly with the transportation company.

All correspondence concerning the instrument should specify the model and serial number. This information appears on the company name plate. Any inquiry concerning details of operation, possible modifications, etc., should be addressed to the Sales Department, Berkeley division of Beckman Instruments, Inc., Richmond 4, California.

REPAIR SERVICE

Experienced service personnel and special test equipment are available at the factory to perform any necessary repairs. Every effort will be made to expedite the repair of instruments returned for servicing. Repair work will be performed only upon receipt of a written purchase order or authorization. Instruments to be repaired should be addressed to SERVICE AND REPAIR DEPARTMENT with transportation charges prepaid. Repaired instruments will be returned to the purchaser with transportation charges collect.

Berkeley reserves the right to make changes in design at any time without incurring any obligation to modify equipment previously purchased to conform to subsequent design changes.

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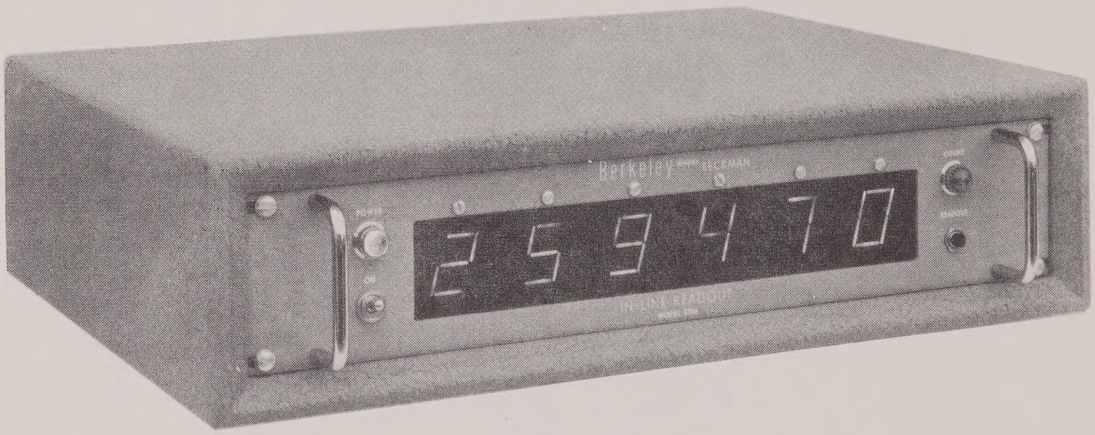


Six-digit In-Line Readout, Model 5916

GENERAL DESCRIPTION

The In-line Readout displays the reading of an attached electronic counter in large, illuminated digits on a single horizontal line. The digits are bright red against a dark background and 1-1/4 inches high. This display may be read without effort from well over 40 feet on a perpendicular to the face of the display panel. Since the digits lie in the same vertical plane, they are legible when line-of-sight angles only 15 degrees to the face of the panel, thus permitting readings over an arc of 150 degrees in front of the instrument. Due to the strong color and the brightness contrast between digits and background, readability is not impaired by intense ambient light.

When operated automatically, the electronic counter counts for a predetermined period, holds the registered count during the display period, then resets to zero and begins counting again. The attached in-line readout displays the count registered at the end of a counting period and holds this number throughout the display period plus the whole succeeding counting period. When counting stops again, the latch is released and only those digits which differ from the previous reading change-the others neither change or flicker. Because the in-line display is present even while the basic instrument is both counting and displaying, the time that the counter holds the registered number can be reduced, permitting more count samples per unit time. In response to a rapidly cycling counter, the in-line display will change as often as 13 times per second-faster than an operator can distinguish individual readings.

DIFFERENCES BETWEEN MODELS

Different In-Line Readout Models in the 5910 Series differ only in the number of digits each displays. Each model is designed to operate with electronic counters which generate a readout code for that number of digits.

In-Line Readout	Digits Displayed	May be directly connected to these counters
Model 5916	6	Models 7060, 7160, 7260, 7360 5571 & 5510
Model 5915	5	Models 7050, 7150, 7250 & 7260

In addition, most other Berkeley electronic counters can be modified to operate with the In-Line Readout satisfactorily.

SPECIFICATIONS

Number of Digits Displayed

4 on Model 5914
5 on Model 5915
6 on Model 5916

Character of Display

Bright-red illuminated digits on a dark background.

Digits are 1-1/4" high, all lying in same vertical plane flush with face of panel.

Accuracy

Absolute. Over-all accuracy of counter and in-line readout is same as accuracy of counter.

Coded Input Information

Each decimal digits is represented by a modified binary code in the form of four voltages each at ground potential or -15VDC.

"Take Readout" Signal

For specified maximum readout rate, a 23-volt pulse 50 ms wide, dropping from +3v to -20V is required.

Readout Rate

Maximum rate is a new presentation every 70 ms or as many as 13 presentations per second. Within this limit, readout rate and display time are controlled by counter.

Interconnecting Cable Length

Maximum length is 200 feet. (6-foot cable is supplied with standard equipment.)

Power Requirements

117 volts ±10%, 50 to 60 cps, 125 watts.

Dimensions

With Cabinet: 20- 3/4" wide, 5- 1/2" high 17" deep

Without Cabinet: Front Panel 19" by 3-1/2" 17" deep (Fits in standard relay rack.)

INSTALLATION

The In-Line Readout is customarily placed on top of the counter cabinet or in a standard 19-inch relay rack along with the counter. It may be placed in any location provided that the cable connecting it to the counter is not longer than 200 feet. A 6-foot interconnected cable is normally attached to the In-Line Readout when shipped, but a longer cable may be purchased from the Berkeley Division. To connect to the counter, simply insert the 40-pin plug at the end of the cable into the DIGITAL RECORDER socket at the rear of the counter.

NOTE

A special "Y" connector may be obtained from the Berkeley Division for connecting both the In-Line Readout and the Model 1452 Digital Recorder to the counter. This connector is not a simple "Y" because the "permit scanning" signal to the recorder must pass through the In-Line Readout before reaching the recorder.

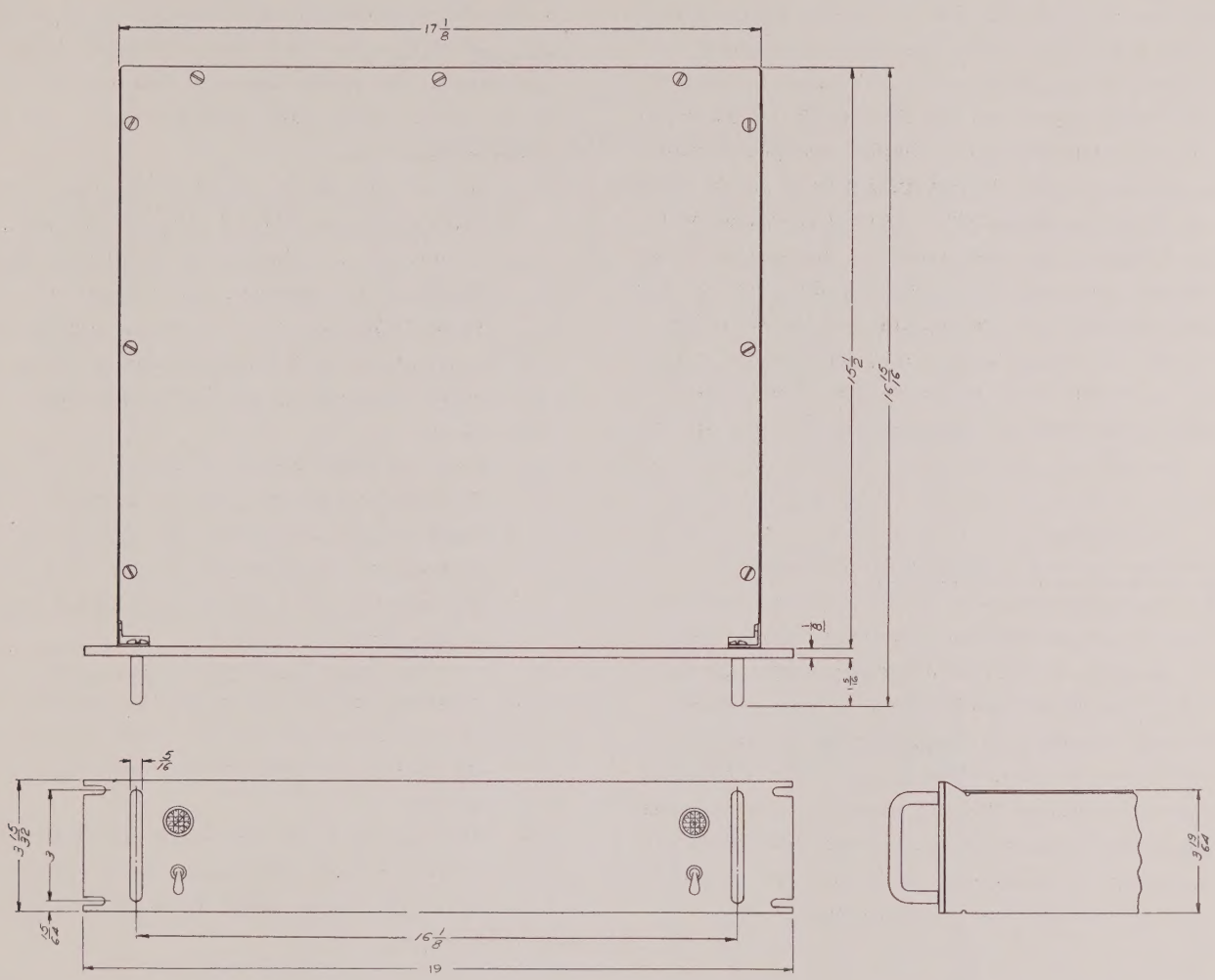


FIGURE 1. CHASSIS DIMENSION FOR RACK MOUNTING

OPERATION

Connect the In-Line Readout to a source of 117-volt, 50 to 60 cps power. The unit consumes about 125 watts. Turn the power switch ON. Plug in-Line Readout connector into counter digital recorder socket , then operate the counter in the usual way. The In-Line Readout will automatically display the count registered by the decimal counting units at the end of each counting period.

Some Berkeley counters contain a decimal counting unit used as a frequency divider when performing some functions. Because this DCU does not send a 4-line code to the In-Line Readout, the digit it registers will not appear in the in-line display. Counters containing such a DCU may be recognized by "X10" positions on the "FUNCTION" switch. The DCU is the one seen on the far left when facing the front panel.

The READOUT indicator lights whenever count information from the counter is actually being entered into the In-Line Readout. Under automatic operation it will light for a fraction of a second at the end of each counting period. With the READOUT pushbutton depressed, the READOUT indicator remains lit and the in-line display changes continuously along with the changing display on the counter itself. If the READOUT button is held down while the counter is actively counting, the In-Line Readout will attempt to follow the rapidly mounting registered count at the top speed of the decoding relays. To avoid unnecessary wear on the relays the operator should press the READOUT pushbutton only when a continuous readout is required.

Testing for Proper Operation. To test the unit thoroughly the operator should apply the readout code for digits zero thru 9 to each module while watching to see that each digit is displayed properly. The most simple method is to cause the decimal counting unit supplying the 4-line code to the module to cycle slow enough so that each digit display is visible, but fast enough so that the test does not become time-consuming. One count per second (a complete cycle in 10 seconds) is about the right speed. In Berkeley counters featuring a TIME-SECONDS switch, the chain of DCU's can be internally driven at counting rates ranging from 1 cps to 1Mcs, thus making it possible to cycle any selected DCU in the chain at a convenient speed. Counters which may be operated this way are Models 7150, 7160, 7340, 7360 and 5510. Proceed as follows:

(1) With no input to the counter, place the FUNCTION switch at PERiod and start the unit counting by rotating the "B" TRIGGER VOLTAGE (LEVEL) control. In this position of the FUNCTION switch the clock-pulse generator supplies pulses to be counted at the pulse interval indicated by the TIME-SECONDS switch.

(2) Turn the TIME-SECONDS switch to "1" and depress the READOUT button on the In-Line Readout. In this position the counter will accumulate one count per second. The "units" display on the In-Line Readout should cycle visibly from zero thru 9.

(3) Turn the TIME-SECONDS switch to 10^{-1}. In this position the counter will accumulate 10 counts per second and the "tens" display on the In-Line Readout should change once a second.

(4) Rotating the TIME-SECONDS switch to successively lower positions, observe correspondingly higher order digits on the In-Line Readout.

INPUT REQUIREMENTS AND OUTPUT CHARACTERISTICS

Any of the Berkeley counters listed on page 1 furnish adequate input signals for the In-Line Readout. However, if the unit is to be used with some other counter or digital device, the operator should make certain that adequate signals appear.

Coded Input. The coded input should be applied to pins 1 thru 24 of the interconnecting plug (P202). See the schematic diagram for pin connections and Table 1 for the code used. A voltage representing a "1" in the code must be ground potential or positive with respect to ground. A voltage representing a "0" must be -15VDC or more negative with respect to ground. The output impedance of the source generating these voltages must be 1 megohm or less.

Controlling Input Signal. The readout period is initiated by a negative transient applied to pin 39 of the interconnecting plug. The voltage at this pin should drop from +3 volts to -20 volts in less than 5 milliseconds. The voltage must remain at -20 volts or more negative for at least 50 ms; it need not return to +3 volts, until time for the next readout period. The input circuit is an open triode grid by passed to ground by 500 $\mu\mu$f. A d-c return path of 1.0 megohms or less should be provided by the driving circuit.

Inhibit Reset Signal. Under automatic operation, circuitry within the In-Line Readout grounds pin 40 of the interconnecting plug during the readout period and leaves this pin floating at all other times.

"Initiate Scanning" Signal for Recorder. The voltage at pin 35 of the interconnecting plug follows the controlling input signal at pin 39 with a 10-volt shift in d-c level. For example, if pin 39 swings from +3 to -20 volts, pin 35 will swing simultaneously from +13 to -10 volts. The output impedance at pin 35 is 120K ohms.

CIRCUIT DESCRIPTION

Over-All Plan. Referring to Figure 2 note that each decimal counting unit in the counter is coupled through four readout lines to a Model 5901 Readout Module. These lines carry a modified binary code in the form of a combination of high or low voltages which cause the Readout Module to display the digit the DCU is registering if the module is free to react. Under automatic operation, the module will react only during a 70-millisecond "readout" period which occurs at the end of each counting period. During the readout period, the digit registered by each DCU appears on the corresponding in-line module. At the end of the period the module is locked in this condition until the next counting period is complete.

Unlike the Model 1452 Digital Recorder which scans readout information from each DCU successively, the In-Line Readout is a fully parallel system; that is, readout information from all DCU's is applied at the same time, and all modules react simultaneously to create the in-line display.

The readout period (the time during which the Modules respond to the counter) is controlled by the cathode follower, the relay amplifier and the control relay, acting on a signal from the counter.

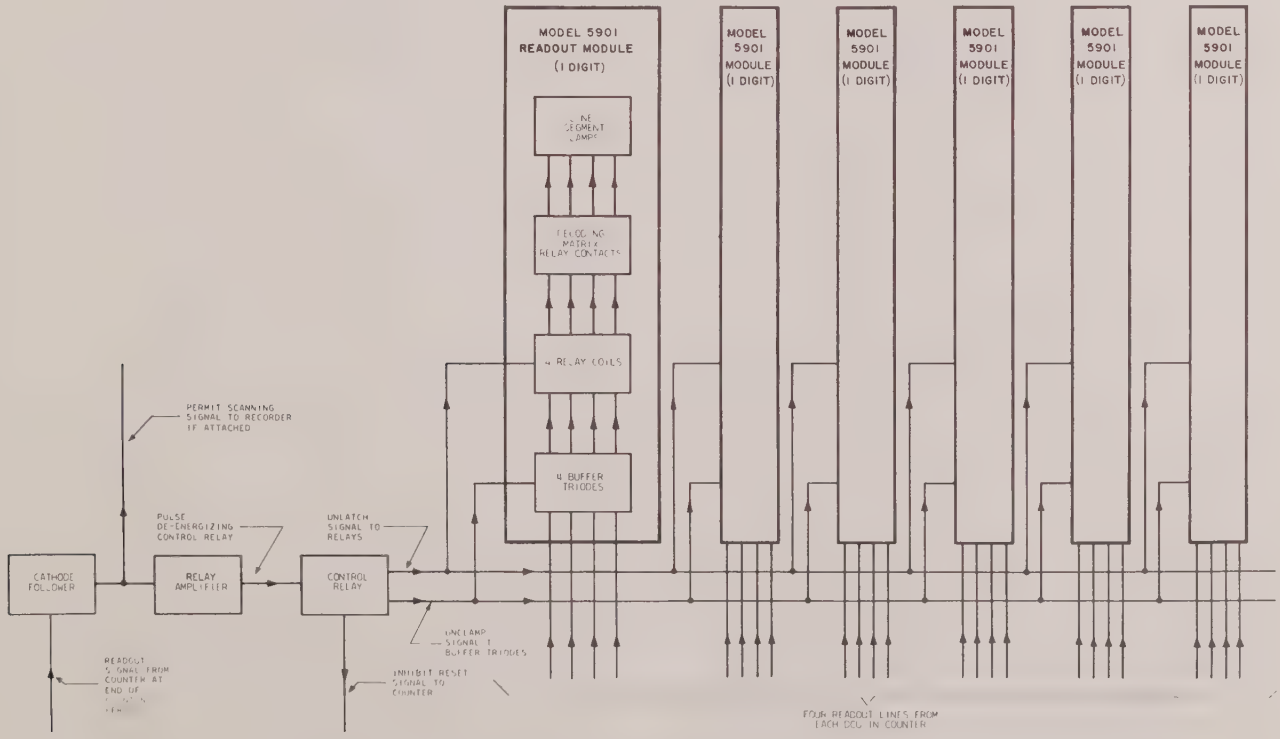

MODEL 5901 READOUT MODULE (1 DIGIT)
MODEL 5901 MODULE (1 DIGIT)
MODEL 5901 MODULE (1 DIGIT)
MODEL 5901 MODULE (1 DIGIT)
MODEL 5901 MODULE (1 DIGIT)
MODEL 5901 MODULE (1 DIGIT)
NE SEGMENT LAMPS
DECODING MATRIX RELAY CONTACTS
4 RELAY COILS
4 BUFFER TRIODES
PERMIT SCANNING SIGNAL TO RECORDER IF ATTACHED
PULSE DE-ENERGIZING CONTROL RELAY
UNLATCH SIGNAL TO RELAYS
CATHODE FOLLOWER
RELAY AMPLIFIER
CONTROL RELAY
UNCLAMP SIGNAL TO BUFFER TRIODES
READOUT SIGNAL FROM COUNTER AT END OF
INHIBIT RESET SIGNAL TO COUNTER
FOUR READOUT LINES FROM EACH DCU IN COUNTER

FIGURE 2. BLOCK DIAGRAM, MODEL 5916. MODEL 5915 CONTAINS ONLY FIVE READOUT MODULES; MODEL 5914, ONLY FOUR.

Decoding During the Readout Period. A Model 5901 Readout module appears in the upper left-hand corner of the main schematic. The In-Line Readout contains from four to six identical modules. Each module translates a standard Berkeley 4-line voltage code from a DCU into a digit display formed by 2 to 7 illuminated segments.

Every module contains two 12AV7 dual triodes with a relay coil in the plate circuit of each of the four triodes. During the readout period the cathodes of these buffer triodes are grounded by the "set line" so that each triode may react to the readout voltage applied to its grid. Furthermore, during this period the plate relays are unlatched because their latching swingers (1D, 2D, 3D & 4D on the schematic) are connected to +225VDC, the same voltage appearing at the other side of the relay coils. Under these conditions each triode conducts or fails to conduct in response to voltage on the readout line connected to its grid. If the voltage on the readout line is -15VDC or more negative with respect to ground, the triode is cut off and the relay coil remains de-energized or drops out if it was energized at the end of the previous readout period. If the readout line is at ground potential or positive with respect to ground, the relay pulls in or remains energized if it was pulled in at the end of the previous readout period.

The combination of energized and de-energized relays sets up the relay swingers in the decoding matrix to form a desired pattern of conducting paths. These closed-contact paths carry 4.5 volts at 60 cps to only those segment lamps which form the digit represented by the 4-line code.

At the end of the readout period the latching swingers are grounded through the "latch display line". If a latching swinger has been pulled in during the decoding action, a current path is created from +225VDC through the relay coil and latching swinger to ground, so that the relay remains energized. An instant after the relays latch, the cathodes of the buffer triodes are disconnected from ground and connected to +80VDC through the "set line", so that no triodes can conduct in response to the 4-line code. In this condition the in-line display is held until the next readout period is initiated by the basic counter.

State of Unit Before a Readout Period. The control circuitry is shown in the lower left-hand corner of the main schematic. Before a readout period (that is, when the counter is actively counting) there is no signal to the relay amplifier (V201B) and it conducts steadily through the coil of the control relay (K201) because its grid is connected to +80VDC through R205. With the control relay energized, swinger K201B connects the latching swinger of all relays in the readout modules to ground. If a module relay happens to be energized, this swinger completes a conducting path from +225VDC through the relay coil and limiting resistor to ground, so that the relay will remain energized even though its buffer triode is not conducting. Pulled-in control relay contact K201A connects the cathode of each buffer triode to +80-volts d-c. This bias prevents all triodes from conducting through plate relay coils, so that no relay not already latched can be energized. In this state, the modules cannot respond to the 4-line code from the counter.

Initiating a Readout Period. At the end of a counting period in the basic counting equipment, a negative pulse of at least 50 milliseconds duration is applied to the control grid of the cathode follower (V201A) through pin 39 of the cable connecting the counter and the In-Line Readout. This negative signal is coupled from the cathode of V201A to the grid of the relay amplifier (V201B) through timing capacitor C203, thus cutting off the plate current in V201B momentarily and de-energizing K201. Contacts K201A, B and C then change state.

(1) K201B ungrounds the latching swingers on all the module relays and connects them to +225 VDC, so that the voltage across the relay coils will be zero unless the associated triode conducts. This unlatches the previous display.

(2) Contacts K201A disconnect the cathodes of the buffer triodes from the +80VDC bias and grounds them. This permits the buffer triodes to respond to the readout voltage on their grids.

(3) Contact K201C grounds the "inhibit reset" line to the counter, thus preventing the counter from resetting and destroying the readout code applied to the buffer triodes.

At this point the module relays set up according to the 4-line code from each decimal counting unit as described under " Decoding During the Readout Period".

Terminating a Readout Period. After the module relays have had time to set up, C203 will have discharged sufficiently through R205 to allow the relay amplifier (V201B) to conduct through K201 once again. K201 then pulls in relay contacts K201A, B and C to the same position they held before the readout signal from the counter occurred. Contact K201B latches the module relays an instant before contact K201A cuts off the buffer triodes, so that no readout information will be lost. Contacts K201C unground the inhibit reset line to the counter (pin 40 on the interconnecting socket) so that the counter may reset and take another sample count. The in-line display is held until the next count is complete. This results in a continuous in-line presentation throughout both the display time and the counting period of the basic counter. Since the In-Line Readout requires only about 70 milliseconds to set-up a display, it will display as many as 13 sample counts per second. When the same digit is repeated on succeeding counts, the module relays do not change state.

Manual Control of Readout Period.

Depressing the READOUT pushbutton breaks the cathode circuit of V201B, allowing control relay K201 to drop out. Contact K201B unlatches the module relays and K201A connects the cathodes of the buffer triodes to ground through the "set line". This action is described in detail in (1) and (2) under "Initiating a Readout Period". The readout period so initiated persists as long as the READOUT pushbutton is held down. During this time the "inhibit reset" line is not grounded as in automatic operation, but is lifted from ground by the pushbutton switch so that the counter can cycle without interference. While the pushbutton is depressed the module relays and the in-line display follow the count as it develops in the counter. Do not leave the pushbutton blocked for extended periods because some of the faster operating relays may prematurely accumulate the rated 50,000,000 operating cycles.

TROUBLESHOOTING

Disassembly. A readout module must be removed from the chassis before the module cover can be removed. Two front-panel screws and two screws on the bottom of the chassis hold the module in place. Remove these screws and slip off the rear connector to free the module. To free the cover, remove the four screws projecting through the printed circuit board into the cover lip. To expose the segment lamps remove two more screws holding the metal casting. Ordinarily, bulbs can be screwed in with the fingers, but a pair of pliers may be necessary. See the parts location diagram (Figure 3) and wiring diagram (Figure 4).

IMPORTANT NOTE

When replacing the module cover, be sure it is fitted tightly against socket board and the metal casting before tightening the four screws on the printed circuit board. The best procedure is to insert the front panel screws through the mounted casting and socket board, screwing them into the cover, thus forcing cover, socket board and casting into a tight sandwich. After this the four screws on the printed circuit board may be tightened and the front-panel screws removed to be reinserted through the front panel.

Burned-Out Segment Lamps. The most common failure is a burned-out or loose segment lamp. To test the lamps turn on the power switch after the unit has been de-energized for a few minutes. For a moment after power is applied (before the buffer triodes have had time to warm-up), the unit should display a row of zeros. This tests all segment lamps except the center horizontal segment. To check this segment take a few random counts, watching for 2's, 3's, 4's, 5's, 6's and 9's, all of which contain a center horizontal segment. Change or check suspected lamp with an ohmeter and in all cases tighten bulb securely. Five spare lamps are shipped with each instrument.

Other Troubles. A failure of a buffer triode, a relay coil or relay contacts in one of the readout modules will cause some segment lamps to light when they should be dark and other to remain dark when they should light. If this condition appears the fault may be localized by the following procedure:

(1) Remove the control relay amplifier tube (V201). This de-energizes the control relay thus creating an indefinite readout period.

(2) Apply the 4-line readout code for each digit 0 thru 9 as directed under "Testing for Proper Operation". While applying the readout code for a digit which is not indicating properly, inspect relays K101 thru K104 to see whether the relays are positioned properly (See Table 1 to find out which relays should be energized.) If a relay is improperly positioned, the fault probably lies in the relay, its associated buffer triode, or in the readout input voltage itself. Foreign particles between a relay armature and core may prevent the relay from latching.

(3) If all four relays are positioned properly the fault probably lies in the relay contacts. Before inspecting the contacts, note for each digit which segments are dark when they should be lit. Then, referring to Table 1, find out which contacts should be closed to create a path to the unlit segments and examine these contacts for a failure to make contact. For example, suppose segment 5 on the "6" is not lit. In the table, "5" appears in the "Segments Lit" column opposite decimal digit 6. Opposite segment 5 (in the column labeled "Relay Contacts Creating Path to Segment Lamp") is "4A (NO), 1A (NC)". This means that the proper current path to segment 5 runs through the normally closed (NC) contacts associated with swinger 1A and, farther on, through the normally open (NO) contacts associated with swinger 4A. Therefore, examine these contacts to see which are not fully closed. Notice that 4A (NO) means that the normally open contacts should be closed when a six is displayed. When the contacts have been repaired so that (for all digits) all segments are lit which should be, there will ordinarily be no segments lit when they should be dark.

Table 1. Decoding Scheme

DECIMAL DIGIT	4-LINE CODE*				SEGMENTS LIT	RELAY CONTACTS CREATING PATH TO SEGMENT LAMP
	1st Binary Stage (K101)	2nd Binary Stage (K102)	3rd Binary Stage (K103)	4th Binary Stage (K104)		NC = normally closed contacts NO = Normally open contacts
0	0	0	0	0	1	4C (NC), 1B (NC), 3A (NC), 1A (NC)
					2	3B (NC)
					3	3C (NC), 1C (NC), 2A (NC), 1A (NC)
					4	1B (NC), 3A (NC), 1A (NC)
					5	3A (NC), 1A (NC)
					6	2A (NC), 1A (NC)
1	1	0	0	0	2	3B (NC)
					3	3C (NC), 1C (NO)
2	0	1	0	0	1	4C (NC), 1B (NC), 3A (NC), 1A (NC)
					2	3B (NC)
					4	1B(NC), 3A (NC), 1A (NC)
					5	3A (NC), 1A (NC)
					7	2B (NO)
3	1	1	0	0	1	4C (NC), 1B (NO), 2B (NC)
					2	3B (NC)
					3	3C (NC), 1C (NO)
					4	1B (NO), 2B (NO)
					7	2B (NO)
4	0	1	1	0	2	2C (NO), 4 B (NC), 3A (NO), 1A (NC)
					3	3C (NO)
					6	2A (NO), 3B (NC)
					7	2B (NO)
5	1	1	1	0	1	4C (NC), 1B (NO), 2B (NO)
					3	3C (NO)
					4	1B (NO), 2B (NO)
					6	2A (NO), 3B (NO)
					7	2B (NO)
6	0	0	1	1	1	4C (NO)
					3	3C (NO)
					4	1B (NC), 4A (NO), 1A (NC)
					5	4A (NO), 1A (NC)
					6	2A (NC), 1A (NO)
					7	2B (NC), 3A (NO), 1A (NC)
7	1	0	1	1	1	4C (NO)
					2	2C (NC), 1A (NO)
					3	3C (NO)
8	0	1	1	1	1	4C (NO)
					2	2C (NO), 4B (NO)
					3	3C (NO)
					4	1B (NC), 4A (NO), 1A (NC)
					5	4A (NO), 1A (NC)
					6	2A (NO), 3B (NO)
					7	2B (NO)
9	1	1	1	1	1	4C (NO)
					2	2C (NO), 4B (NO)
					3	3C (NO)
					4	1B (NO), 2 B (NO)
					6	2A (NO), 3B (NO)
					7	2B (NO)

*"0" represents a readout voltage of -15VDC or more negative, triode cut off and de-energized relay. "1" represents a readout voltage at ground or positive of ground, triode conducting and an energized relay.

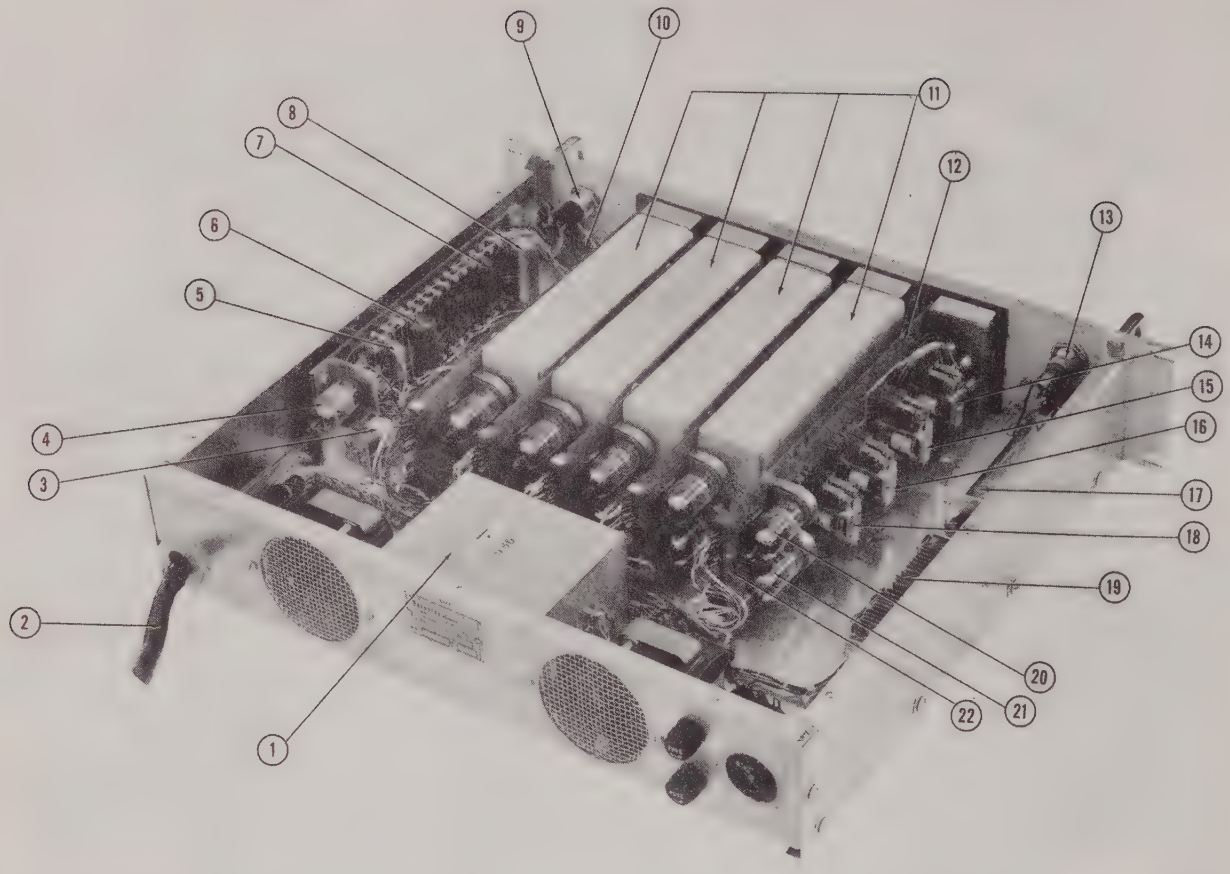


FIGURE 3. PARTS LOCATION. INSTRUMENT PICTURED IS A FIVE-DIGIT UNIT FROM LOT 1. SUBSEQUENT LOTS MAY DIFFER IN MINOR DETAILS.

1. T201, Power Transformer
2. Interconnecting Cable to Counter
3. K201, Control Relay
4. V201 (Dual Triode), Cathode Follower and Relay Amplifier
5. C203, Timing Capacitor
6. C206, Filter Capacitor for -10VDC Supply
7. C201, Capacitor Shunting Control Relay Coil
8. C202
9. I201, COUNT Indicator
10. S201, READOUT Pushbutton Switch
11. Model 5901 Readout Modules with Covers
12. Model 5901 Readout Module with Cover Removed
13. I202, POWER Indicator
14. K104, Decoding Relay
15. K101, Decoding Relay
16. K102, Decoding Relay
17. C205A & B, Filter Capacitors for +225VDC Supply
18. K103, Decoding Relay
19. CR201, Power Supply Rectifier
20. V102 (Dual Triode), Buffer Triodes for K101 & K104
21. V101 (Dual Triode), Buffer Triodes for K102 & K103
22. Connector to Readout Modules

PARTS LIST

Parts listed below appear all three models (5914, 5915 and 5916) unless otherwise noted. Component parts of the Model 5901 In-Line Readout Module are listed in a separate table at the rear.

Detail No.	Berkeley Stock No.	Description	Manufacturer & No.
	Model 5901	In-Line Readout Module (4 in Model 5914) (5 in Model 5915) (6 in Model 5916)	Berkeley Division Beckman
B201 & B202	9-6643	Fan Motor	General Industries F-5-CW 110 Vac
C201	2-3356	Capacitor, .047 μfd 400V DC Paper	Sprague 109P47304
C202	2-6676	Capacitor, .47 μfd 300V DC Paper	Sangamo SK-03047-S1 20%
C203		Same as C201	
C204	2-3504	Capacitor, 500 μμfd, Ceramic	Erie GP1K
C205	2-2753	Capacitor, 80μfd, 350 V DC	Sangamo PLD 3580
CR201	8-4113	Rectifier, Selenium	GE 6RS21PB6AAD1
CR202	8-0668	Diode 1N34A	Kemtron
F201 & F202	7-0504A	Fuse, 2 Amp, Slo Blo	Littlefuse 313002
I201	21-1679	Lamp, 105-125 V	GE NE 51
I202	21-1677	Lamp, 608 V	GE 47
K201	16-6591	Relay	Potter Brumfield MH 2894-2
P201	17-3185	Receptalce, AC Motor Base Plug	Hubbell 7486
R201	1-0232	Resistor, 100 Ω, 1 W, 10 %	Allen-Bradley Co. GB 1011
R202	1-3547	Resistor, 100 Ω, 1/2 W, 5 %	Allen-Bradley Co. EB 1015
R203		Same as R201	
R204	1-1177A	Resistor, 680 K, 1/2 W, 5 %	Allen-Bradley Co. EB 6845
R205	1-1178A	Resistor, 4.7 M, 1/2 W, 5 %	Allen-Bradley Co. EB 4755
R206	1-0213A	Resistor, 27 K, 1/2 W, 5 %	Allen-Bradley Co. EB 2735
R207		Same as R202	
R208 & R209	1-1188	Resistor, 10 Ω, 1 W, 10 %	Allen-Bradley Co. GB 1001
R210 & R211	1-1575B	Resistor, 33K, 2 W, 10 %	Allen-Bradley Co. HB 3335
R212	1-0234B	Resistor, 8.2 K, 2 W, 10 %	Allen-Bradley Co. HB 8225
R213		Same as R206	
S201	12-2215	Switch, Reset Pushbutton NC	Switchcraft 1005
S202	12-1642	Switch, BAT Toggle DPST	CH 8370K8
T201	6-S6589	Transformer, Power	Berkeley Division Beckman
V201	5-3301	Tube, Type 5965	

Detail No.	Berkeley Stock No.	Description	Manufacturer & No.
XV201	4-2973	Socket, 9 Pin W/O Shield W/Lugs	Elco 377BC
XI201	4-6089	Socket, Amber Multiview Lens	Dialco 52410-994
XI202	4-1678	Socket, Green Lens	Dialco 81410-432
XF201 & XF202	4-3154	Fuse Post, Fuse Holder	Buss HKP
	17-6590	Connector for Printed Circuit (4 in Model 5914, 5 in Model 5915, 6 in Model 5916)	Amphenol 143-015-01-1006
	17-5593	Connector, 40 Pin	DPX-40-33P-Cannon Electric Mates with DPS 32S
	10-6506	Line Cord, Cord Set	

MODEL 5901 READOUT MODULE PARTS

Detail No.	Berkeley Stock No.	Description	Manufacturer & No.
C101, &C102 C103, C104	2-6595	Capacitor, .04 μfd, 500 V DC	Radio Materials Co.
I101 & I102, I103, I104, I105 I106, I107	21-2958	Lamp	GE 1768
K101	16-6592	Relay, For Printed Circuit -3 FC 2 FB, 1 FA	Potter Brumfield MH 2860-3
K102 & K103 K104	16-6610	Relay, For Printed Circuit 2 FA-2 FC	Potter Brumfield MH 2993
R101 & R102 R103, R104	1-1575B	Resistor, 33 K, 2 W, 5 %	Allen-Bradley HB 3335
R105 & R106 R107, R108	1-0312	Resistor, 22 K, 1/2 W, 5 %	Allen-Bradley EB 2235
V101 & V102	5-3301	Tube, 5965	
XI101 & XI102 XI103, XI104, XI105, XI106, XI107, XI108	4-2957	Socket, Midget Screw Base for Lamp 1768	GE
	25-6673	Printed Circuit	Berkeley Division Beckman 5901 C12
	25-6674	Lamp Block Face Plate	Berkeley Division Beckman 5901 C2
	25-6675	Lamp Block Casting	Berkeley Division Beckman 5901 C4

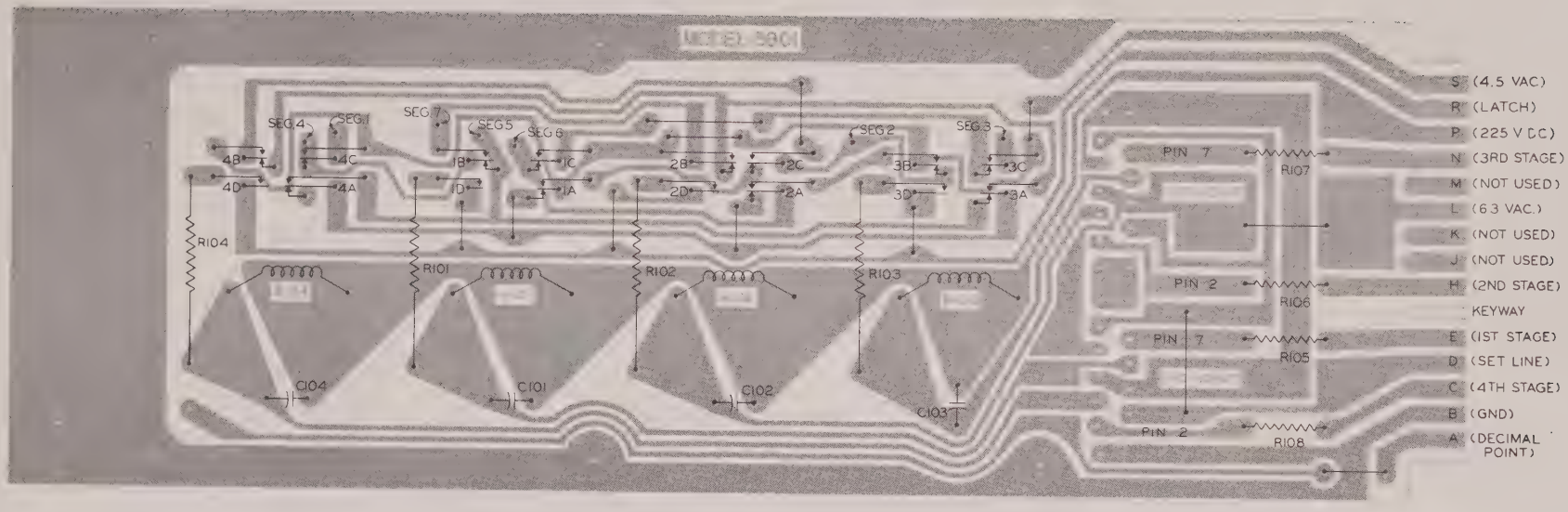
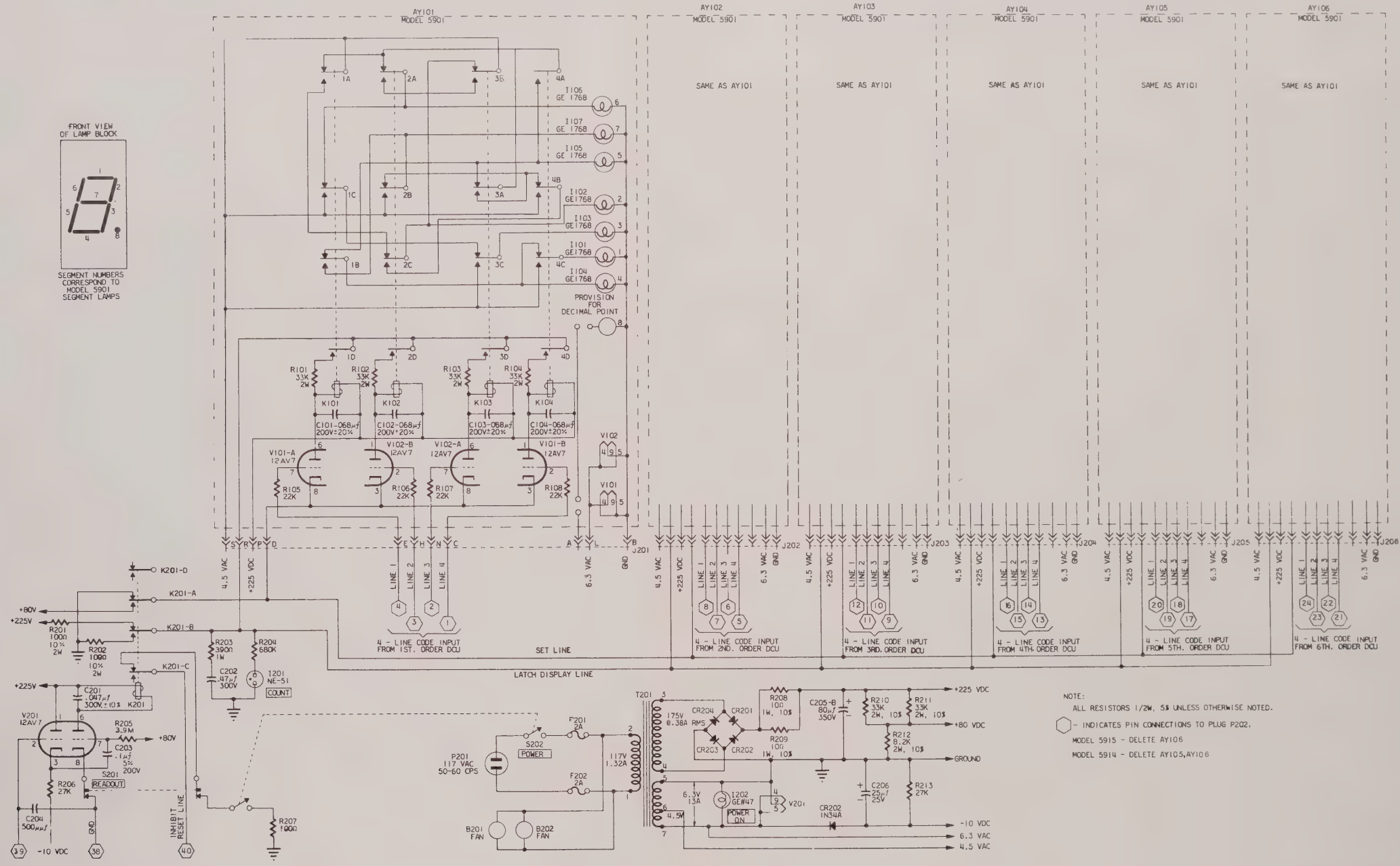


FIGURE 4. WIRING DIAGRAM, MODEL 5901 READOUT MODULE.


AY101 MODEL 5901
AY102 MODEL 5901
AY103 MODEL 5901
AY104 MODEL 5901
AY105 MODEL 5901
AY106 MODEL 5901
SAME AS AY101
FRONT VIEW OF LAMP BLOCK
SEGMENT NUMBERS CORRESPOND TO MODEL 5901 SEGMENT LAMPS
PROVISION FOR DECIMAL POINT
4 - LINE CODE INPUT FROM 1ST. ORDER DCU
4 - LINE CODE INPUT FROM 2ND. ORDER DCU
4 - LINE CODE INPUT FROM 3RD. ORDER DCU
4 - LINE CODE INPUT FROM 4TH. ORDER DCU
4 - LINE CODE INPUT FROM 5TH. ORDER DCU
4 - LINE CODE INPUT FROM 6TH. ORDER DCU
SET LINE
LATCH DISPLAY LINE
INHIBIT RESET LINE
POWER ON
NOTE:
ALL RESISTORS 1/2W, 5% UNLESS OTHERWISE NOTED.
- INDICATES PIN CONNECTIONS TO PLUG P202.
MODEL 5915 - DELETE AY106
MODEL 5914 - DELETE AY105, AY106

SCHEMATIC DIAGRAM
IN-LINE READOUT
MODEL 5910 SERIES
DWG. NO. 5910 D 1

July 1959

IMPORTANT NOTE

We, at Beckman Instruments, Inc., have recently adopted a new nine-digit part numbering system which identifies each part utilized in our instruments. However, the parts lists of many of our instruction manuals are not yet updated for the new part numbering system.

Therefore, when ordering parts, please recognize that there may be a change in the part number.

If the parts list in your instruction manual does not conform to the new nine-digit system, it will be cross-referenced at the factory when you place your order.

Also, we have a continuing engineering program for improving and upgrading the performance of our instruments. So some of the parts that come in your equipment may have since been replaced by newer, better, more efficient and equivalent parts. Therefore, you might not always receive identical parts for replacement.